

AMENDMENTS TO THE CLAIMS

The claims in this listing will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) A data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the file comprising:

address information for a root directory; and
start address information for an unrecorded area existing in a volume space, the start address information being recorded in the volume space as part of root directory file management information,

wherein the unrecorded area for which start address information is recorded is used for updating root directory file management information when a new file is recorded on the data storage medium.

2. (Previously Presented) A data storage medium as described in claim 1, wherein the start address information is recorded using an indirect entry for managing a root directory file recording area.

3. (Previously Presented) A data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the file comprising:

address information for a root directory;
invalid data not used for retrieving volume/file structure, the invalid data being recorded before and after volume/file structure and a data file; and
invalid extent management information for managing an invalid data recording area, the invalid extent management information being recorded in a volume space as part of root directory file management information.

4. (Previously Presented) A data storage medium as described in claim 3, wherein the invalid extent management information is recorded using an allocation descriptor for managing a root directory file recording area.

5. (Currently Amended) A data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the file comprising:

address information for a file set descriptor;
root directory file management information that is plurally recorded as main chaining information and reserve chaining information, the reserve chaining information being a duplicate of the main chaining information;
first address information, corresponding to an area in which the main chaining information and the reserve chaining information are recorded at a beginning of a volume space, that is recorded as part of the file set descriptor; and

second address information, corresponding to an area in which the main chaining information and the reserve chaining information is update recorded, that is recorded as part of the main chaining information and the reserve chaining information.

6. (Currently Amended) A data recording method for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the method comprising:

recording address information for a root directory; and

recording chaining information comprising recording start address information for an unrecorded area existing in a volume space as part of root directory file management information, the unrecorded area for which start address information is recorded being used for updating root directory file management information when a new file is recorded on the data storage medium.

7. (Previously Presented) A data recording method as described in claim 6, wherein recording the chaining information further comprises recording the start address information for the unrecorded area using an indirect entry for managing a root directory file recording area.

8. (Previously Presented) A data recording method for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the method comprising:

recording address information for a root directory; and
recording chaining information comprising recording invalid data not used for retrieving volume/file structure before and after volume/file structure and a data file, and recording invalid extent management information for managing an invalid data recording area as part of root directory file management information.

9. (Previously Presented) A data recording method as described in claim 8, wherein recording the chaining information further comprises recording the invalid extent management information using an indirect entry for managing a root directory file recording area.

10. (Currently Amended) A data recording method for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the method comprising:

recording address information for a file set descriptor;
recording file set information comprising recording, as part of the file set descriptor, address information for an area in which main chaining information

and reserve chaining information are recorded at a beginning of a volume space,
the reserve chaining information being a duplicate of the main chaining
information; and

recording chaining information comprising plurally recording the main chaining information and the reserve chaining information having address information of an area in which root directory file management information and the main chaining information and the reserve chaining information are update recorded.

11. (Currently Amended) A data recording apparatus for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the apparatus comprising:

an address information recorder that ~~record~~ records address information for a root directory; and

a chaining information recorder that records start address information for an unrecorded area existing in a volume space as part of root directory file management information, the unrecorded area for which start address information is recorded being used for updating root directory file management information when a new file is recorded on the data storage medium.

12. (Previously Presented) A data recording apparatus as described in claim 11, wherein the chaining information recorder records the start address information for the unrecorded area using an indirect entry for managing a root directory file recording area.

13. (Previously Presented) A data recording apparatus for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the apparatus comprising:

an address information recorder that records address information for a root directory; and

a chaining information recorder that records invalid data, not used for retrieving volume/file structure, before and after volume/file structure and a data file, and that records invalid extent management information, for managing an invalid data recording area, as part of root directory file management information.

14. (Previously Presented) A data recording apparatus as described in claim 13, wherein the chaining information recorder records the invalid extent management information using an indirect entry for managing a root directory file recording area.

15. (Currently Amended) A data recording apparatus for performing a formatting process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the apparatus comprising:

an address information recorder that records address information for a file set descriptor;

a file set information recorder that records, as part of the file set descriptor, address information for an area in which main chaining information and reserve chaining information are recorded at a beginning of a volume space, the reserve chaining information being a duplicate of the main chaining information; and

a chaining information recorder that plurally records main chaining information and reserve chaining information having address information of an area in which root directory file management information and the main chaining information and the reserve chaining information are update recorded.

16. (Currently Amended) A data recording method for performing a file recording process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the method comprising:

recording address information for a root directory; and

recording chaining information comprising recording start address information for an unrecorded area existing in a volume space as part of root

directory file management information, the unrecorded area for which start address information is recorded being used for updating root directory file management information when a new file is recorded on the data storage medium.

17. (Previously Presented) A data recording method as described in claim 16, wherein recording the chaining information further comprises recording the start address information for the unrecorded area using an indirect entry for managing a root directory file recording area.

18. (Previously Presented) A data recording method for performing a file recording process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the method comprising:

recording address information for a root directory; and
recording chaining information comprising recording invalid data not used for retrieving volume/file structure before and after volume/file structure and a data file, and recording invalid extent management information for managing an invalid data recording area as part of root directory file management information.

19. (Previously Presented) A data recording method as described in claim 18, wherein recording the chaining information further comprises recording the

invalid extent management information using an indirect entry for managing a root directory file recording area.

20. (Currently Amended) A data recording method for performing a file recording process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the method comprising:

reproducing file set information comprising reproducing address information of an area in which main chaining information and reserve chaining information are recorded at a beginning of a volume space using a file set descriptor, the reserve chaining information being a duplicate of the main chaining information; and

recording chaining information comprising reproducing, using the main chaining information or the reserve chaining information, following the main chaining information or the reserve chaining information, or root directory file management information, and

plurally recording the main chaining information and the reserve chaining information having address information of an area in which the root directory file management information and the main chaining information and the reserve chaining information are update recorded.

21. (Currently Amended) A data recording apparatus for performing a file recording process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the apparatus comprising:

an address information recorder that records address information for a root directory; and

a chaining information recorder that records start address information for an unrecorded area existing in a volume space as part of root directory file management information, the unrecorded area for which start address information is recorded being used for updating root directory file management information when a new file is recorded on the data storage medium.

22. (Previously Presented) A data recording apparatus as described in claim 21, wherein the chaining information recorder records the start address information for the unrecorded area using an indirect entry for managing a root directory file recording area.

23. (Previously Presented) A data recording apparatus for performing a file recording process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the apparatus comprising:

an address information recorder that records address information for a root directory; and

a chaining information recorder that records invalid data not used for retrieving volume/file structure before and after volume/file structure and a data file, and that records invalid extent management information for managing an invalid data recording area as part of root directory file management information.

24. (Previously Presented) A data recording apparatus as described in claim 23, wherein the chaining information recorder records the invalid extent management information using an indirect entry for managing a root directory file recording area.

25. (Currently Amended) A data recording apparatus for performing a file recording process on a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the apparatus comprising:

an address information reproducer that reproduces address information for a file set descriptor;

a file set information reproducer that reproduces address information of an area in which main chaining information and reserve chaining information are recorded at a beginning of a volume space using the file set descriptor, the reserve chaining information being a duplicate of the main chaining information; and

a chaining information recorder that reproduces, using the main chaining information or the reserve chaining information, following the main chaining information or the reserve chaining information, or root directory file management information that plurally records the main chaining information and the reserve chaining information having address information of an area in which the root directory file management information and the main chaining information and the reserve chaining information are update recorded.

26. (Currently Amended) A data reproducing method for performing a file reproducing process from a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the method comprising:

reproducing address information for a file set descriptor;

reproducing file set information comprising reproducing address information for an area in which main chaining information and reserve chaining information are recorded at a beginning of a volume space using the file set descriptor, the reserve chaining information being a duplicate of the main chaining information; and

recording chaining information comprising reproducing, using the main chaining information or the reserve chaining information, following the main chaining information or the reserve chaining information, or root directory file management information.

27. (Currently Amended) A data reproducing apparatus for performing a file reproducing process from a data storage medium for recording and reproducing a file managed using a volume/file structure in which a number of data recording operations to a same area is limited, the apparatus comprising:

an address information reproducer that reproduces address information for a file set descriptor;

a file set information reproducer that reproduces address information for an area in which the main chaining information and the reserve chaining information are recorded at a beginning of a volume space using the file set descriptor, the reserve chaining information being a duplicate of the main chaining information; and

a chaining information recorder that reproduces, using the main chaining information or the reserve chaining information, following the main chaining information or the reserve chaining information, or root directory file management information.

28. (New) A data storage medium as described in claim 3, wherein the invalid extent management information is used to identify large invalid data recording areas to be used as file recording areas.

29. (New) A data recording method as described in claim 8, wherein the invalid extent management information is used to identify large invalid data recording areas to be used as file recording areas.

30. (New) A data recording apparatus as described in claim 13, wherein the invalid extent management information is used to identify large invalid data recording areas to be used as file recording areas.

31. (New) A data recording method as described in claim 18, wherein the invalid extent management information is used to identify large invalid data recording areas to be used as file recording areas.

32. (New) A data recording apparatus as described in claim 23, wherein the invalid extent management information is used to identify large invalid data recording areas to be used as file recording areas.